

**NMFS RESPONSE TO CONTRACT REPORT: "BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE"
(SISSENWINE AND ROTHSCILD 2011)**

EXECUTIVE SUMMARY

In 2009, NOAA requested the Research Council to review the agency's science program review processes. In a proactive and concurrent effort, NMFS undertook an exercise to develop a standardized review process for its science programs. As a first step, two contractors were hired with the following terms of reference: 1) Ascertain the scope and frequency of current programmatic reviews; 2) Develop a proposed framework for program reviews; 3) Provide a list of priorities for program reviews and a draft schedule; 4) Recommend an oversight and documentation mechanism to track both the nature of the reviews and actions taken to address recommendations; 5) Review the overall NMFS scientific enterprise and select NMFS programs and make recommendations on the science being undertaken, reported, and transitioning into management decisions. NMFS has reviewed the recommendations contained in the contract report and intends to initiate efforts to implement a Strategy for NMFS Science Reviews. This strategy will ensure that NMFS science continues to be rigorous, useful to management applications, and relevant to NMFS mandates. It will be conducted at the NMFS Science Center level, with significant oversight and integration provided by the NMFS Office of Science and Technology in consultation with the NMFS Chief Science Advisor, and applicable at the agency level. Central to the strategy is a commitment to schedule dedicated time for strategic planning for the future through direct involvement by NMFS frontline science leaders (i.e., the NMFS Science Board). And it is sufficiently flexible to allow for incorporation of emerging issues and new major science programs that may develop in the future.

BACKGROUND

On November 2, 2009, a memorandum from the NOAA Senior Science Advisor to the NOAA Research Council Chair requested that NOAA establish consistent, agency-wide peer review and monitoring processes for all NOAA scientific activities. To proactively address this need, the NOAA Fisheries Service contracted with two experienced fisheries professionals in 2010 to meet the following objectives:

1. Ascertain the scope and frequency of current programmatic reviews conducted by NMFS;
2. Develop a proposed framework for programmatic reviews that is sensitive to the intersections among physical entities and the distribution of activities among them;
3. Provide a nominal list of priorities for laboratory and programmatic reviews and as well as a draft schedule for such reviews;
4. Recommend an oversight and documentation mechanism to track both the nature of the reviews and actions taken to address recommendations;

NMFS RESPONSE TO: "BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE"

5. Review the overall NMFS scientific enterprise and select NMFS programs, as directed, and make recommendations on the science being undertaken, reported, and transitioning into management decisions.

The final deliverable from this contract was to be *"A final report including a summary and analysis of the current programmatic review policies and practices of the six science centers. This report shall also include recommendations for improvement and standardization including frequency, oversight, documentation, and action taken on recommendations given during reviews, etc."* (From NMFS Statement of Work to Contractor)

Here, NMFS presents our response in the form of an action plan to the contractors' report: "Building Capacity of the NMFS Science Enterprise" by Michael Sissenwine and Brian Rothschild, January 2011 (hereafter, the Report).

SCOPE AND FREQUENCY OF CURRENT NMFS SCIENCE REVIEWS (STATEMENT OF WORK OBJECTIVE 1)

NMFS science centers have followed varying schedules for science reviews and chosen science programs to review in a variety of ways. NMFS agrees with the Report in that a review policy at the agency level, consistently applied across all science centers and applied as soon as possible, has great potential to benefit the agency and meet the NOAA objective of providing for consistent, agency-wide peer review and monitoring of scientific activities.

POLICY FOR NMFS SCIENCE REVIEWS (STATEMENT OF WORK OBJECTIVES 2-4)

The Report contains a proposed science review policy that addresses objectives 2-4 in their Appendix 4. Based on the proposed recommendations, consideration of a prior strategy designed by the Office of Science and Technology (reproduced in Appendix 5 of the Report), and input from the NMFS Science Board, NMFS is developing a "Strategy for NMFS Science Reviews" to serve as the agency standard into the future (Appendix 1). This strategy includes:

- Defining major science programs nationally with adequate overview to ensure the principles of best practices and agency consistency are achieved;
- A five-year review cycle;
- The general nature and scope of questions to be used to review major science programs;
- The use of peer review for program reviews and for major research products;
- The general size (number of individuals) of external panels for program reviews;
- The general composition of review panels (to include independent scientists with expertise in the subject matter of the program being reviewed, stakeholders from within the agency, the NMFS Chief Science Advisor and the Director of the Office of Science and Technology);
- A process to ensure ongoing evaluation, reassessment, and strategic planning for the future aimed at assurance of science quality;
- A science program review database.

NMFS RESPONSE TO: “BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE”

Not all elements of the science review policy presented in the Report were incorporated into the resulting NMFS plan. In particular:

- The major science programs were defined differently¹;
- Rather than conduct reviews in every year of a five-year cycle, year five will be dedicated to strategic planning;
- Rather than construct an external panel of five to seven members that serve five-year terms (the “National Program Review Panel”) and are responsible for planning, implementing, and overseeing the review process, and following up on subsequent action plans, these responsibilities will be fulfilled by the existing NMFS Science Board².

REVIEW OF THE NMFS SCIENCE ENTERPRISE (STATEMENT OF WORK OBJECTIVE 5)

Six of the 13 formal findings listed in Section 2, and two of the four formal recommendations listed in Section 3 of the Report were directly related to this objective, as was material presented in Appendices 3 and 6. The nature of the comments in this section of the Report were broad and advisory, building on the opinions of the Report’s authors. Many good observations and suggestions were offered. The NMFS Science Board and other senior leadership will consider the Report’s findings and implement changes as appropriate.

CONCLUSIONS

Incorporating some elements of the Report, NMFS is currently developing a Strategy for NMFS Science Reviews (Appendix 1). This strategy will ensure that NMFS science continues to be rigorous and relevant to NMFS mandates. When adopted, it will be implemented at the Science Center level, across Science Centers for major cross-cutting themes, and applicable at the agency level. It will establish a NMFS policy that requires scheduling of dedicated time for strategic planning for the future through direct involvement by NMFS frontline science leaders (i.e., the NMFS Science Board). NMFS believes that the proposed approach is sufficiently flexible to allow for incorporation of emerging issues and new major science programs that may develop in the future, while not requiring allocation of significant additional resources.

APPENDIX 1 – PROPOSED STRATEGY FOR NMFS SCIENCE REVIEWS

¹ The Report proposed five major science programs. The first two, Fisheries Science and Conservation Science, correspond roughly to the first two in the NMFS plan. A number of elements in the Report’s remaining three proposed science programs (Observing Systems, Ocean Ecology, and Habitat Ecology and Ecosystem Health) are integral to the first two and they have been incorporated as such in the NMFS plan. (In fact, the Report explicitly state that the optimal design for their third proposed major science program will depend on the data needs of the first two.) The remaining elements of the last three science programs in the Report are contained in the third science program in the NMFS plan. The Report does not explicitly define an Emerging Issues science program; that has been added to the NMFS plan.

² This will cut unnecessary process inefficiencies inherent in involving an external body, will not compromise the integrity of the peer review process (reviewers will be identified through the Center for Independent Experts), will directly involve NMFS science leadership in strategic planning for the future, and will save significant funds that would otherwise be required to pay an external panel’s salary, travel, and support staff.

Goals of NMFS Science Reviews

The importance of high quality science is fundamental to NOAA as a science-based agency. To maximize the transparency and effectiveness of major intramural science programs located at the six Science Centers and those located in or coordinated through NMFS Headquarters, and to ensure that NMFS scientists are conducting high quality scientific investigations of significant value to NOAA and the nation, NMFS conducts objective peer reviews of scientific activities currently underway or completed in major programs at its Science Centers on a regular basis using agreed upon criteria. This proposed strategy will unify the science review process across the agency as detailed below.

The five proposed specific goals of NMFS Science Reviews (Annex 1) are to:

1. Ensure that NMFS research is scientifically rigorous;
2. Ensure that NMFS science is relevant (i.e., it addresses NMFS mandates and emerging issues);
3. Ensure that NMFS science is effective;
4. Provide a mechanism for integration of NMFS science across science centers/ S&T, and for ongoing strategic planning regarding NMFS science at the agency level;
5. Provide a mechanism for optimal coordination and utilization of resources necessary for NMFS science.

These goals should link directly to Terms of Reference (TORs) for science reviews, and the TORs, in turn, should form the framework of the reviewer reports. This standardization and clarity will greatly enhance the utility of science reviews for all involved.

Definition of Major Science Programs and Review Cycle

Major science programs within NMFS can be organizational (e.g., a Division or Branch) or thematic (e.g., coral ecosystem conservation and assessment, stock assessment) in nature. They are labeled as such because they either (a) comprise a “significant” proportion of the overall financial resources of a particular Science Center; or (b) comprise “significant” numbers/percentage of human resources (e.g., FTE’s and contractors at that particular Science Center); or (c) are deemed scientifically critical (e.g., identifying essential fish habitat, protecting and restoring endangered and threatened species) to fulfilling the goals, objectives, and mandates of both NOAA and NMFS; or (d) are deemed to be politically sensitive (e.g., salmon protection, marine protected area development and assessment). What constitutes a major program may cut across many scales, whether they are part of a larger national or multi-Center effort or be entirely Center-specific.

That said, certain core science activities form the cornerstone of NMFS science (see below). These activities should be subject to periodic and regular review. At the same time, it is important that review topics not be over-prescribed. Although much of NMFS science is

NMFS RESPONSE TO: “BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE”

mandate-driven, its scientists must be encouraged to proactively address emerging issues and the review process should embrace the necessary and ongoing evolution of research areas of focus required to fulfill NMFS’ mission.

With this in mind, it is proposed that NMFS science reviews be conducted on a five year cycle (adhering with the general plan of five-year strategic science plans) on the following major science programs (Annex 2):

Year 1: Research supporting the Magnuson-Stevens Act (Program 1)

Year 2: Research supporting the Endangered Species and Marine Mammal Protection acts (Program 2)

Year 3: Strategic research (Program 3)

Year 4: Emerging issues (Program 4) and other major science programs not included above (Programs 5 and additional)

Year 5: Strategic Planning - No reviews will be conducted during Year 5. Time is instead spent developing/revising a science strategic plan at the agency level, with dedicated time by the Science Board to consider recommendations from the previous year’s reviews and to develop a strategic plan for the next five years.

Reviews will be conducted at the Science Center level, each of the six Science Centers conducting one science program review during each of four years, with a fifth year off. In some circumstances, reviews may encompass more than one Science Center. At the agency level, this corresponds to six reviews, all of the same science program, conducted at each or a combination of the Science Centers during each of four years, with the fifth year off for strategic planning. It is recognized that the value of science program reviews will be greatly enhanced if there is a clear role in terms of national oversight and use of best practices. This is to be accomplished by a strategic assignment of roles among Science Board members (see below).

Review Panel Composition and Roles and Responsibilities

In science, peer review is widely, although not universally, accepted as the best mechanism for quality assurance. In the context of NMFS science reviews, peer review (review by specialists in the same field who were not involved in producing the products under review), may be accomplished through scientists external to or within the agency. A review panel composed of both is ideal in order to meet all five goals of NMFS science reviews.

Specifically, Goal 1 requires input from scientists external to the agency, or at least external to the science program under review. Goals 2 and 3 may be better achieved with input from individuals external to the agency as well, but require individuals from within the agency in order to provide context for assessing the relevance and effectiveness of NMFS science. Goals 4 and 5 require individuals from within the agency in order to benefit from the integrative objective of reviewing science across all centers, and to develop a strategic plan to better address mandates and emerging issues and to more effectively manage limited resources.

NMFS RESPONSE TO: “BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE”

This philosophy leads to two panel roles, that of “reviewer” where formal input in written form is provided, and of “observer” where knowledge is gained so as to facilitate integration, optimization of resource use, and strategic planning. Therefore, a guideline for panel membership is proposed, where each panel is comprised of:

- Two to three scientists external to NMFS with expertise in the program under review;
These scientists are reviewers and provide a written assessment that addresses goals 1-3. One or more of these individuals may be members of more than one Science Center review panel, but typically, the identity of these individuals change with the Science Center being reviewed.
- Two to three scientists from within NMFS with expertise in the program under review;
These scientists are reviewers and provide input regarding goals 1-3. They typically would not be from the same region as the program under review. One or more of these individuals may be members of more than one Science Center review panel, but the identity of these individuals would be expected to change with the Science Center being reviewed.
- Director of Office of S&T (or delegate);
This individual is an observer. His/her participation on the panel is critical in order to meet goals 4 and 5 of the review process.
- A Science Center Director from another Center.
Each Science Center Director must attend at least one review per year at a center other than his/her own. His/her attendance is critical in order to meet goals 4 and 5 of the review process. Science Center Directors may be observers or reviewers, depending on their own scientific expertise.

Additional panel members may be invited at the discretion of the Science Board. These include:

- NMFS Chief Science Advisor;
This individual must attend at least one review per year to act as an observer. His/her attendance is valuable in meeting goals 4 and 5 of the review process.
- Science Center Division Chiefs associated with the science program under review;
These individuals may be observers or reviewers, depending on their own scientific expertise.
- Regional Administrators (RAs);
RAs are encouraged to attend each review for their partner Science Center and may attend reviews for other Science Centers. S/he will act as an observer.
- Assistant Regional Administrators associated with policy related to the science program under review.

NMFS RESPONSE TO: “BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE”

- Senior scientists with a given expertise, as appropriate.

External reviewers will be chosen based on expertise, with due consideration of independence and conflict of interest. A list of potential candidates for each Science Center review will be compiled by the appropriate Science Center Director, the Director of the Office of Science and Technology, and the NMFS Chief Science Advisor. Final reviewers will be selected by an external review body (e.g., the Center for Independent Experts or the National Research Council’s Ocean Studies Board) to insure independence.

The Office of Science and Technology will be responsible for overseeing the implementation of the process nationally and reporting progress regularly to the NMFS Science Board. This office will also maintain a program review database, which will be available on its website. This database will include background documents associated with each review (e.g., TORs), written program reviews, and strategic plans produced by the Science Board in response to the science reviews.

Annex 1. The five goals of NMFS science reviews.

1. Ensure that NMFS research is scientifically rigorous

Questions that may be used to evaluate the degree of distinguished and outstanding science being produced by program scientists include:

- How many publications (including externally reviewed refereed ones) are being produced per year by the program and by the individual scientists?
- How “significant” are the publications in contributing to new scientific knowledge, addressing a priority information need, and/or leading to a management action?
- How many proposals (internal, within NOAA/NMFS and external, with academic partners and other agencies) are being generated per year by the program and by the individual scientists? What is the funding success?
- What awards or other forms of recognition were received by staff from other government agencies, environmental groups, or scientific peers?

2. Ensure that NMFS science is relevant (i.e., it addresses NMFS mandates and emerging issues)

Extremely important questions such as “why is the project being undertaken?”, “why isn’t more/less survey effort required?”, and “what management decision will need this information?” are always presented to regulatory agencies in budget-trying times. Further questions may include:

- Does the major science program being undertaken address relevant societal needs, now and projected in the future, both domestically and internationally (e.g., is the Center undertaking the right science and doing it right)?
- Are the projects that are selected for funding fulfilling NOAA/NMFS missions, goals, and objectives? Is the timing of project milestones consistent with Agency needs?
- Can the program’s impact on society, the economy, and the environment be measured?
- How well does the Center’s major science programs being reviewed address the:
 - Next Generation Strategic Plan for NOAA?
 - NMFS Strategic Plan for Fisheries Research?
 - NOAA 5-Year Research Plan?
 - Regional Planning Documents?
 - NOAA Office of Program Planning and Integration Program Charters?
 - Annual priority information needs submitted by the appropriate fishery management councils?

3. Ensure that NMFS science advice is effective

- Are the approaches to fulfill the NOAA/NMFS mission objectives well conceived?
- Has the science addressed important problems?
- Has the science produced significant findings?
- Are the aims of the project(s) being achieved?
- What is the area of impact of the products developed (e.g., local/state, regional/national, international)?
- Are students and young scientists being trained to take on the evolving science mission of NOAA? How active are the Centers in engaging undergraduate and graduate students as well as post-doctoral fellows in their research?

NMFS RESPONSE TO: "BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE"

- Were there any partners that worked on developing these products? What has been their role?
 - To what degree is the science connected with users and other stakeholders through engagement with appropriate user communities and use of partnerships?
 - Is scientific knowledge being advanced and do projects completed by program scientists provide what natural resource managers and policy makers need to make informed decisions? (An example of a significant program outcome is the adoption of a new management strategy based upon scientific data.)
 - Is the science program management effective? Specifically, is the science directorate providing the necessary communication, tools, and resources to support the science? For example:
 - Do program scientists receive appropriate support in terms of budget, IT support, equipment, and infrastructure?
 - Are program scientists appropriately trained and well suited to carry out the projects being pursued?
 - What type of tracking is in place for: Research projects? Fiscal matters? Outreach activities? Accomplishments and benefits?
 - Are effective and visionary long-range planning, development, and adherence to a strategic and implementation plan in place to guide information and budgetary decisions?
 - Has scientific leadership effectively planned for implementation of the research and successfully directed throughout the process? For example:
 - Are program scientists taking advantage of useful collaborative arrangements with external entities?
 - Is the work proposed appropriate to the experience level of the principal investigator and other associated researchers?
 - Do the projects employ novel concepts, approaches, or methods?
 - Do the projects lead to challenging existing paradigms or developing new methodologies or technologies to address complicated management questions?
 - Do the contributions of program scientists result in requests for their participation in a leadership capacity in influential coastal groups at the local, state, and national levels?
 - Do the contributions of Agency support services (e.g., permitting, support of vessel activities, support of aircraft activities) meet the logistic requirements of the principal investigators and associated researchers?
4. Provide a mechanism for integration of NMFS science across science centers/ S&T, and for ongoing strategic planning regarding NMFS science at the agency level
5. Provide a mechanism for optimal coordination and utilization of resources necessary for NMFS science

A goal of program reviews is to identify opportunities to integrate, find efficiencies, pool resources so they are above a critical mass level, and ultimately, to create a program that is greater than the sum of its parts.

Annex 2. The major NMFS science programs.

Program 1: Research supporting the Magnuson-Stevens Act (Year 1 of Review Cycle)

This program addresses a core NMFS mandate. The program may include all or a subset of the following elements, plus additional elements not listed here, for species that are directly targeted by US fisheries:

- Population abundance, trends and dynamics, and assessment
- Population biology
- Stock structure
- Population condition and health
- Ecosystem considerations (e.g., characteristics of important or critical habitat, critical trophic links, ecosystem state/health)
- Social and economic impact assessments
- Decision support tools
- Research to mitigate threats (e.g., habitat alteration, bycatch reduction)
- Data collection: platforms (fishery-independent and dependent), survey design, variables
- Data quality assurance, documentation, archiving, management

Program 2: Research supporting the Endangered Species and Marine Mammal Protection acts (Year 2 of Review Cycle)

This program addresses two core NMFS mandates. The program may include all or a subset of the following elements, plus additional elements not listed here, for species that fall within the jurisdiction of these two acts:

- Population abundance, trends and dynamics, and assessment
- Population biology
- Population structure (including identification of distinct population segments and evolutionarily significant units)
- Population condition and health
- Ecosystem considerations (e.g., characteristics of important or critical habitat, critical trophic links, ecosystem state/health)
- Social and economic impact assessments
- Decision support tools (e.g., Potential Biological Removals, assessment of extinction risk, criteria for listing/de-listing species under the ESA)
- Research to mitigate threats (e.g., habitat alteration, bycatch reduction)
- Data collection: platforms, survey design, variables
- Data quality assurance, documentation, archiving, management

Program 3: Strategic Research (Year 3 of Review Cycle)

This programmatic review consists of research that cuts across taxa and disciplines. It encompasses innovation targeted at advancing the science of conservation and management, at all stages of the scientific process. The review may include all or a subset of the following elements, plus additional elements not listed here:

- Innovation in data collection platforms and technology
- Research focused on elucidating mechanisms and processes
- Innovation in analytical approaches including:
 - Integrated Ecosystem Assessments

NMFS RESPONSE TO: "BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE"

- Comparative analysis of ecosystems
- Innovation in cross-disciplinary science
- Innovation in management tools and approaches including:
 - Ecosystem Based Management approaches
 - Coastal and Marine Spatial Planning
 - Marine Protected Areas
 - Catch Shares

Program 4: Emerging Issues (Year 4 of Review Cycle)

These issues, by definition, are ever changing with time. The NMFS Science Board, in collaboration with broader NMFS and NOAA leadership, will identify the particular issue(s) to be addressed during each review cycle. Current issues that could be considered include, and are not limited to:

- Climate change, including impacts of global warming and ocean acidification
- Ocean noise
- Introduced/invasive species
- Ocean health
- Aquaculture

Other NMFS Science Programs (Programs 5 and additional; Year 4 of Review Cycle)

In addition to the above, NMFS research includes coherent science programs that include, and are not limited to:

- Antarctic and Arctic Research
- Research addressing the needs of international Regional Fishery Management Organizations and other similar bodies
- Research on coral reef ecosystems
- Research on oil spill response in a variety of marine ecosystems

Strategic Planning (Year 5 of Review Cycle)

- The Federal budget process requires a three-year lead time for the development of new initiatives, along with base-funded activities. Therefore, on a regular basis, NMFS needs to evaluate its capacity to respond to priorities established by the current Administration.
- Therefore, it is proposed that at five year intervals, the science enterprise of NMFS assign its scientific leadership to review the overall content of its science portfolio and how this could be improved through (1) revision, (2) expansion, or (3) consolidation.
- Given the existing crisis regarding availability of NOAA provided days-at-sea, and given that the next available opportunity for resolution to the existing funding crisis is fy13, NMFS proposes to identify fy13 in the five year cycle where strategic planning will be the focus.
- If in the appropriation process for fy13 adequate funding for the current fleet of NOAA vessels assigned to NMFS and the approved recapitalization program for NOAA vessels is not supported, the existing approach to providing NMFS management with the scientifically based information used for resource management will have to be revised. This reconfiguration of the NMFS science portfolio should be undertaken immediately.
- If on the other hand, the fy13 appropriations process clearly supports the existing capacity NOAA has regarding research vessels and the approved recapitalization

NMFS RESPONSE TO: "BUILDING CAPACITY OF THE NMFS SCIENCE ENTERPRISE"

program, science leadership in NMFS should use this review period to evaluate whether the existing allocation of resources is appropriate or needs to be changed to better meet the information needs of the Agency.